

GFX

HEPCO GUIDANCE SYSTEM
FOR BECKHOFF XTS

BUSINESS UNIT
**LINEAR
SYSTEMS**

GFX – HEPACO GUIDANCE SYSTEM FOR BECKHOFF XTS



Speeds: up to 4m/s



Low maintenance



Unlimited lengths



Long system life

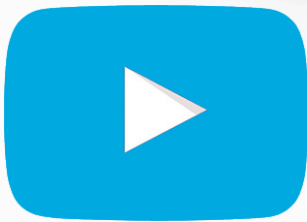
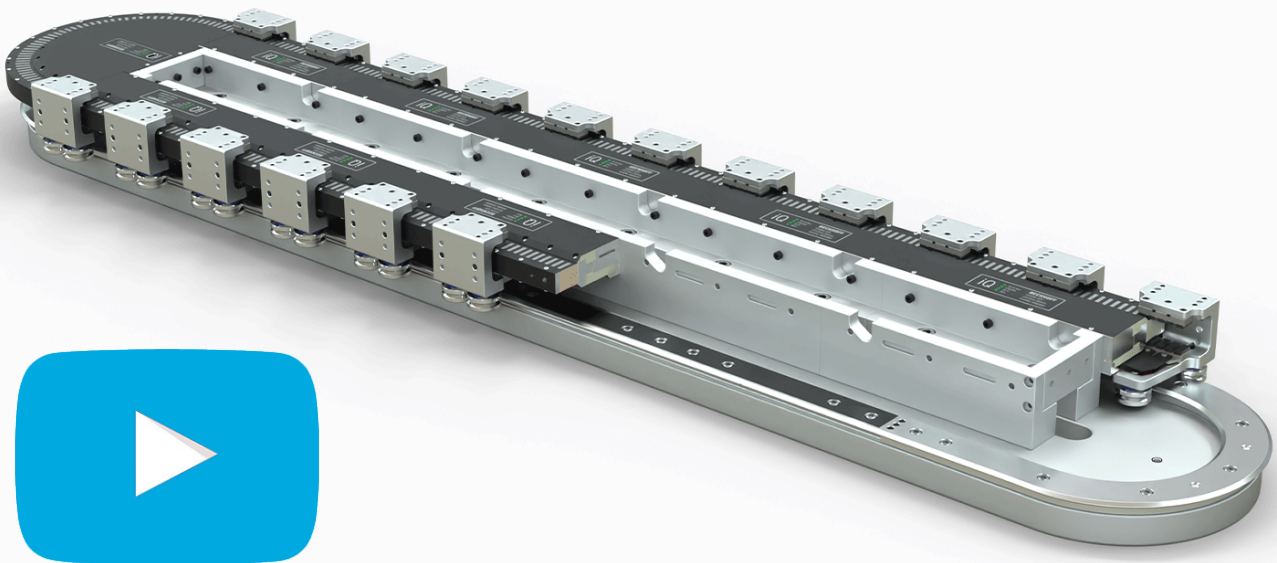


Works in dirty environments



Quiet and smooth running

Hepco's GFX Guidance System for Beckhoff XTS meets the needs of higher duty cycle XTS applications, providing a precise, robust and durable guidance solution.



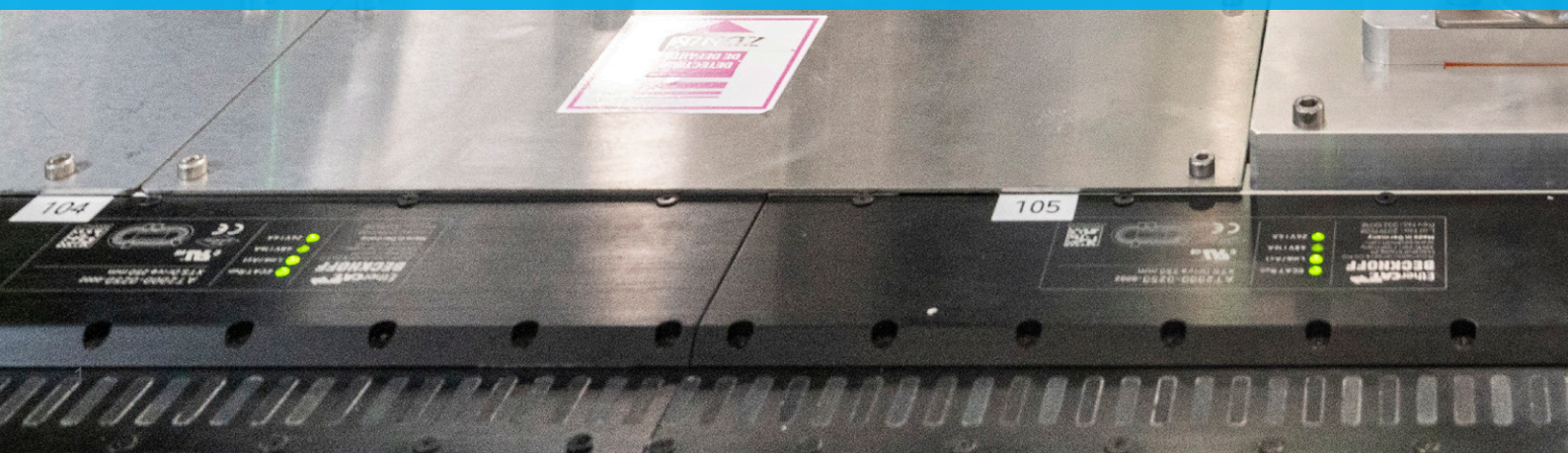
HepcoMotion and Beckhoff – HepcoMotion works in partnership with Beckhoff to create the GFX system, a high-end track system that provides the support and rigidity required for precise XTS applications.

Flexible – The Beckhoff XTS Transport System uses linear motor technology to independently drive movers around a track. This allows work processes of different duration to be combined, on the fly product changes, and the addition or removal of work stations as needed.

Precise and reliable – GFX provides the transport path and mechanically guides the movers along the motor modules at the defined speed, with great precision, ensuring accurate alignment and resistance to deflection.

Long system life – GFX is designed to accommodate complex, high-speed motion profiles requiring extended duty cycles.

Increased Load Capacity – GFX Strong Mover designed to accommodate press load applications.



Contents

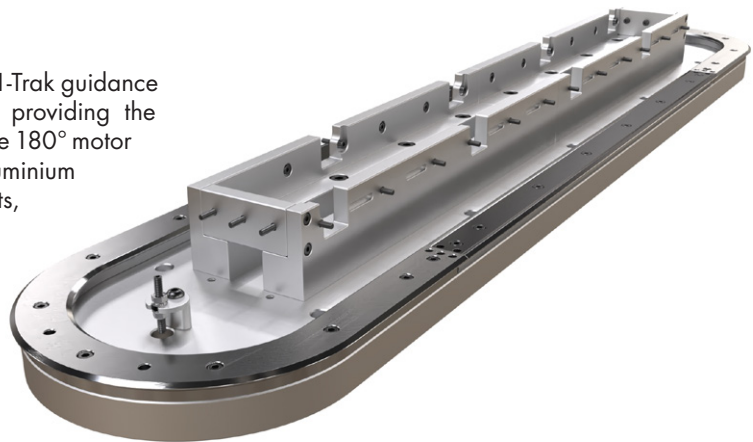
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GFX 1TL System Composition

GFX 1TL Systems

GFX 1-Trak Lite is a spacer slide version of Hepco's 1-Trak guidance system, including a patented curved track form, providing the minimum acceleration path around a tight curve of the 180° motor modules. The track system is mounted on an aluminium baseplate along with a set of motor support brackets, or can be supplied as a track system only for custom installation. Its length is only limited by the number of motors and movers supported by a Beckhoff control system. Please see page 11 or contact Beckhoff for information on these limitations.

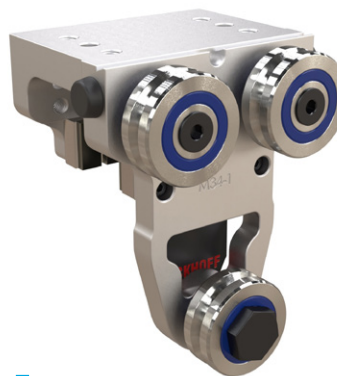


1-Trak Lite systems use three-bearing mover designs.

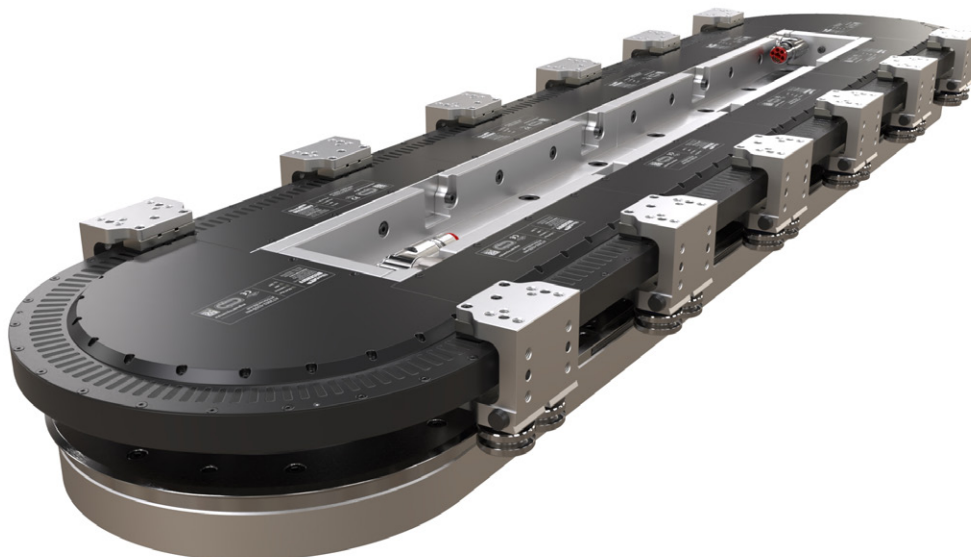
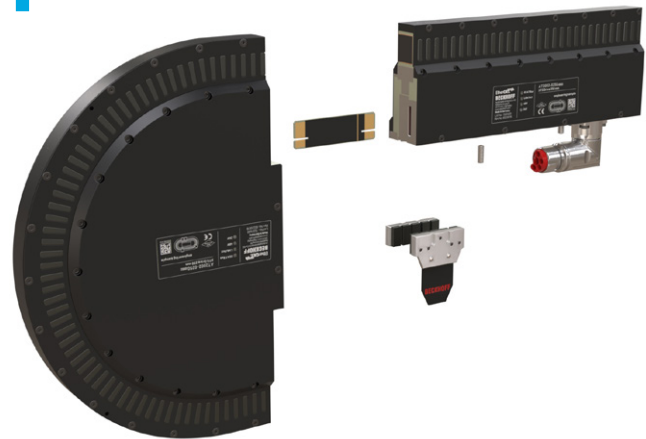
- 25mm outer bearings
- Most compact mover
- Lowest mover mass
- Suitable for light moment loads
- Available in standard lengths: 54mm and 74mm



- 34mm outer bearings
- Compact mover
- Low mover mass
- Suitable for medium moment loads
- Available in standard lengths: 72mm and 82mm

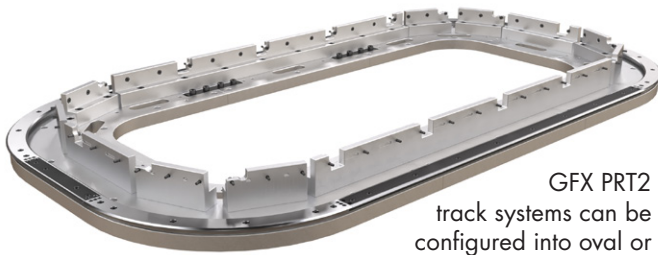


On request Hepco guidance systems can be supplied fully assembled with Beckhoff motor modules, mover magnets and mover encoder flags. Please speak to Hepco's technical department to discuss your requirement.



GFX PRT2 System Composition

PRT2 Ring and Track Systems



GFX PRT2 track systems can be configured into oval or rectangular systems.

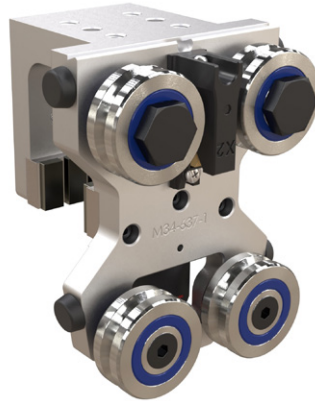
PRT2 Ring Systems



GFX PRT2 ring and track systems use four-bearing fixed centre movers.



- All 25mm bearings
- Compact high moment mover
- Low mover mass
- Suitable for medium loads
- 52mm long as standard



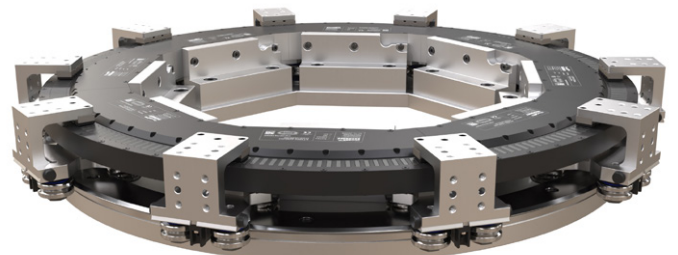
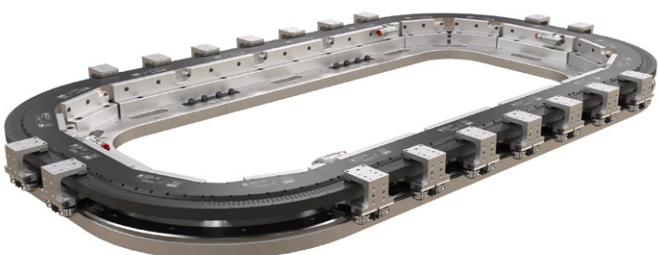
- All 34mm bearings
- Longer bearing life
- Lubricator option
- Suitable for heavier loads
- 80mm long as standard



- **NEW** Strong Mover
- 34mm or 40mm bearings
- Longer bearing life
- Suitable for very heavy loads
- 100mm long as standard



On request Hepco guidance systems can be supplied fully assembled with Beckhoff motor modules, mover magnets and mover encoder flags. Please speak to Hepco's technical department to discuss your requirement.

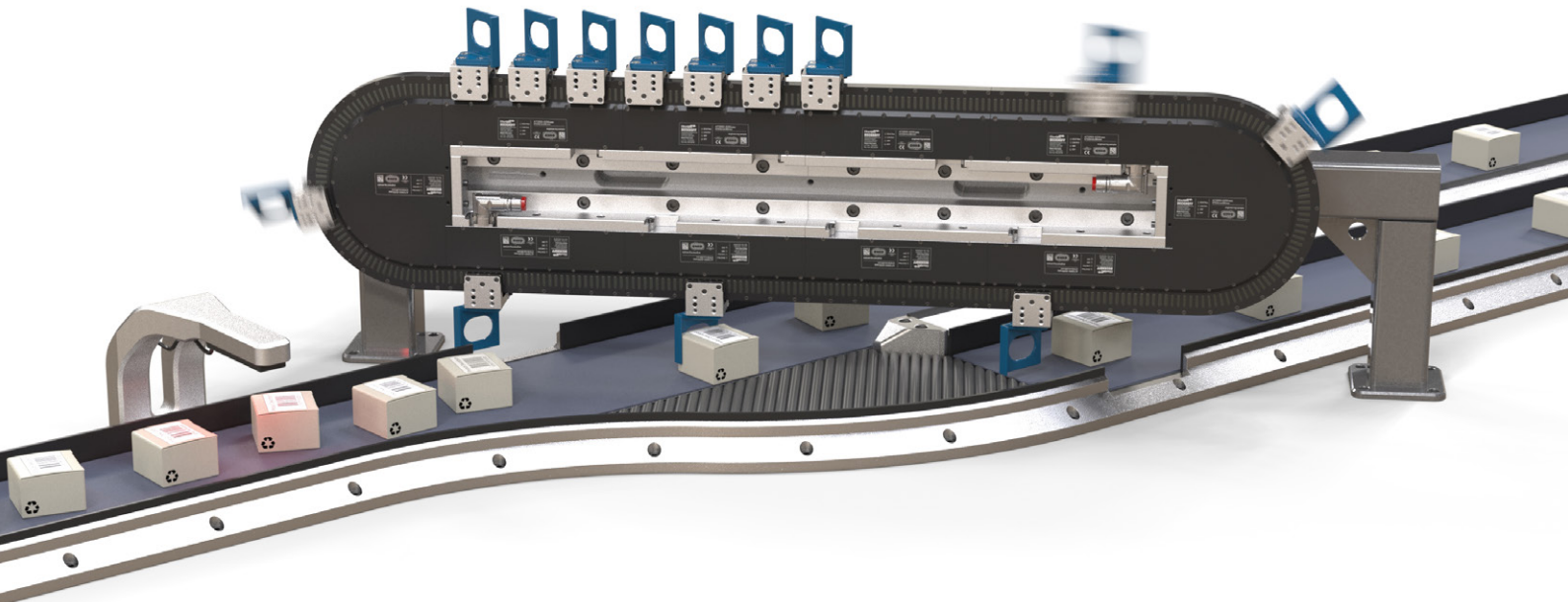


Application Examples - Features and Benefits

High Speed Lane Divider

This example shows a vertically mounted, lightly loaded, high speed and high duty GFX 1-Trak system being used to sort randomly positioned items into two separate lanes.

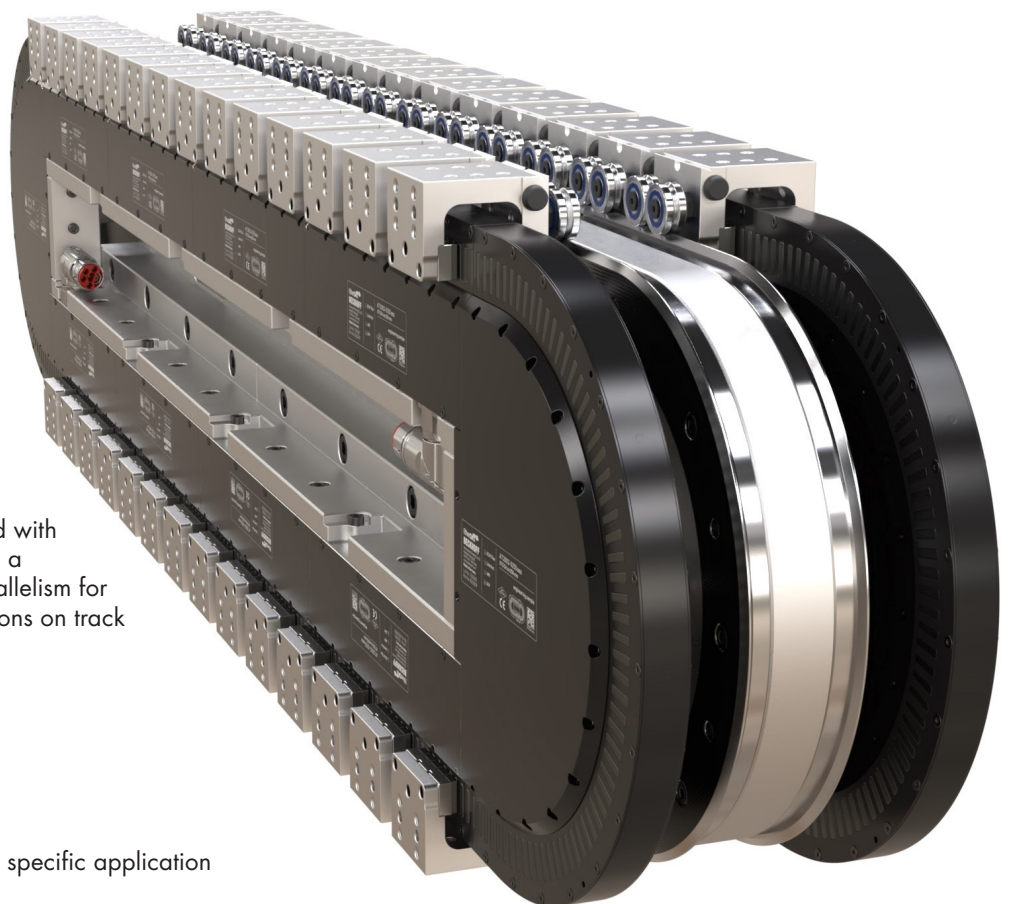
- High rigidity
- Positional repeatability
- Durable - hardened guidance system
- Low maintenance - integrated bleed lubrication
- Standard configuration



Double Sided System

Two GFX 1-Trak systems manufactured with a single 'back to back' base provides a precision assembly and accurate parallelism for applications where the relevant positions on track systems must be closely controlled.

- High rigidity
- Excellent parallelism
- Positional accuracy
- Compact
- Customisable - designed to suit a specific application

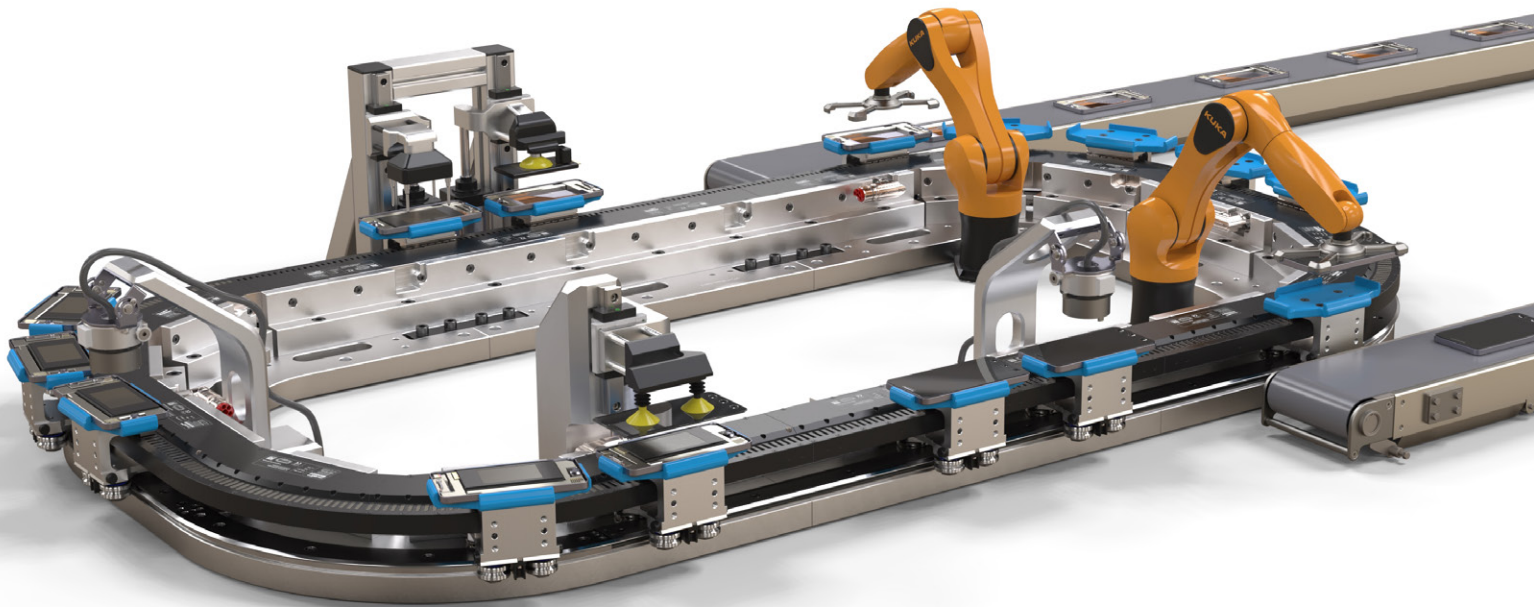


Application Examples - Features and Benefits

Multi-Operation and Variable Speed Application

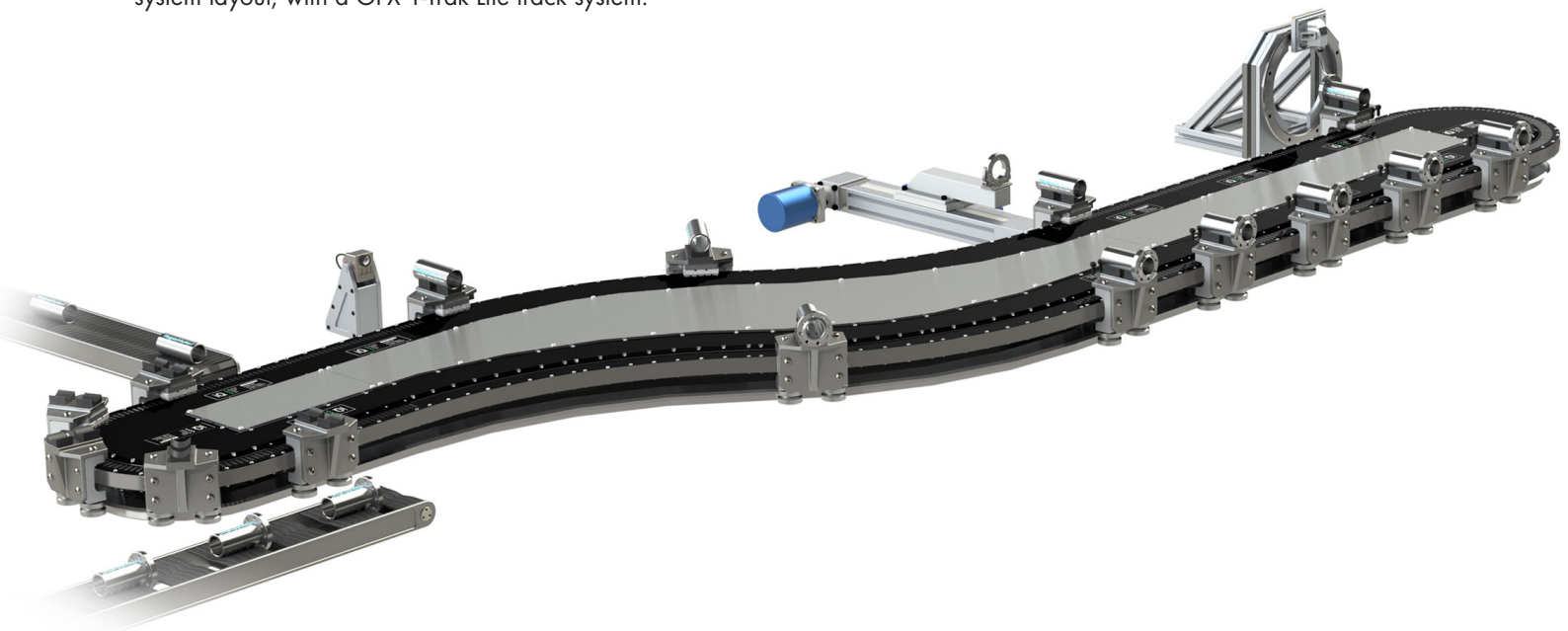
The horizontally mounted system shown below comprises of a GFX PRT2 track system used in a multi operation application.

- Durability - hardened guidance system
- High moment capacity - for higher process forces
- Low maintenance - integrated bleed lubrication
- Machine integration - Hepco MCS support structure
- Precision ring and track technology (PRT2)
- Standard configuration



Multidirectional Bend

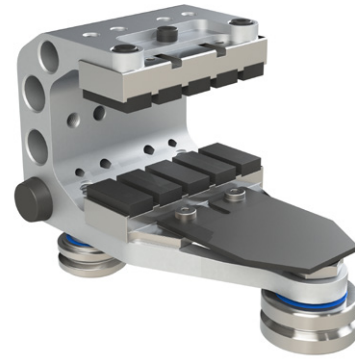
This application utilises 180° end modules, plus internal and external 22.5° curved Beckhoff modules, creating an 'S' bend system layout, with a GFX 1-Trak Lite track system.



- Long and more complex systems available
- High load capacity
- Positional repeatability
- Flexible layout - patented track geometry
- Customisable - designed to suit a specific application

GFX-a

GFX Agile is a low mass variant of the standard GFX track system for Beckhoff XTS products. It is specified for overall payloads (product and tooling combined) of less than 250g, with little or no process loading. It is capable of a maximum velocity of 4m/s and acceleration in excess of 100m/s². It offers very high throughput rates in excess of 700ppm.



GFX Strong Mover

GFX Strong Movers are exclusively designed for the GFX-PRT2 ring and track systems for use with 45° and 22.5° XTS motors. They accept press loads and robotic assembly forces up to 2500N. This is 10 times higher than the standard mover.

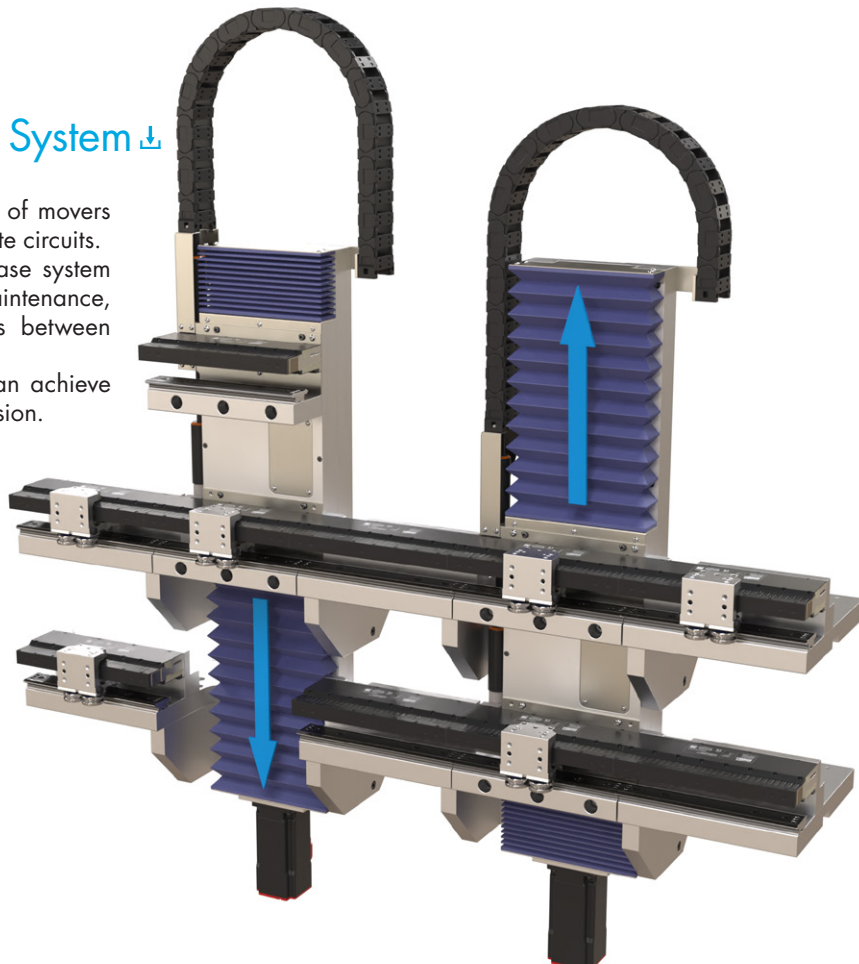
This increase in press load capacity is at minimal cost to the dynamic capability of the XTS drive system. Dynamic payload capacity (tooling and payload) is around twice that of the standard mover.

GFX TMS - Track Management System

GFX Track Management (TMS) facilitates the transition of movers between GFX systems whether they are open or complete circuits. Track Management can be utilised in many ways to increase system functionality, including the removal of movers for maintenance, system re-configuration or for the transfer of movers between systems to accommodate extra processes.

The precision ballscrew driven transfer slide section can achieve cycle times as quick as 0.4 seconds to micron precision.

The TMS assembly is designed to be integrated into standard 1-Trak and PRT2 assemblies. TMS Systems require rigid support structures which will be tailored to suit specific customer applications.



GFX-h ↓

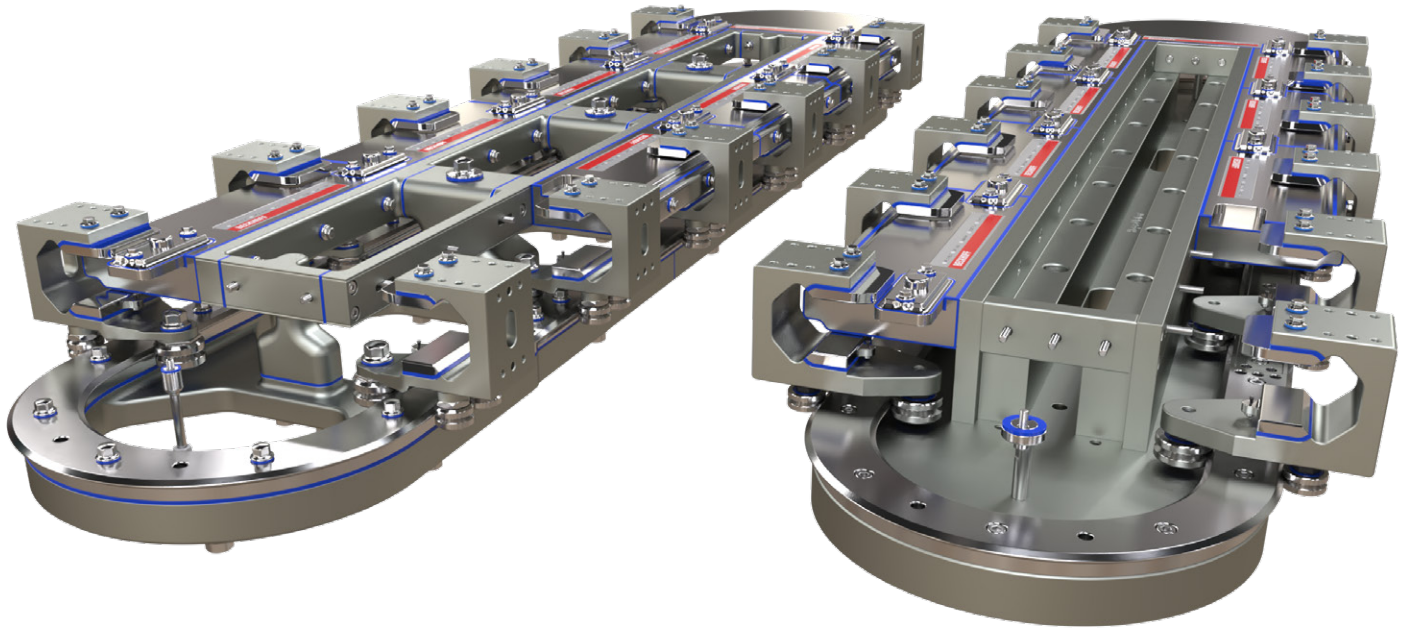
GFX Hygienic Design comprises track system variations that are suitable for use with the Beckhoff "HD" hygienic design XTS motors and magnets. There are three systems which are applicable to differing customer needs:

GFX-hW Washdown

Designed for cleaning in place (CIP) operations that include foaming agents, hot washing and pressure washing. The construction allows complete access to all surfaces, pooling traps are removed, joints between all components are sealed and the bearings are protected against lubricant egress and "flushing" with a solid cover and labyrinth seals. All fasteners are sealed and designed to ease cleaning processes.

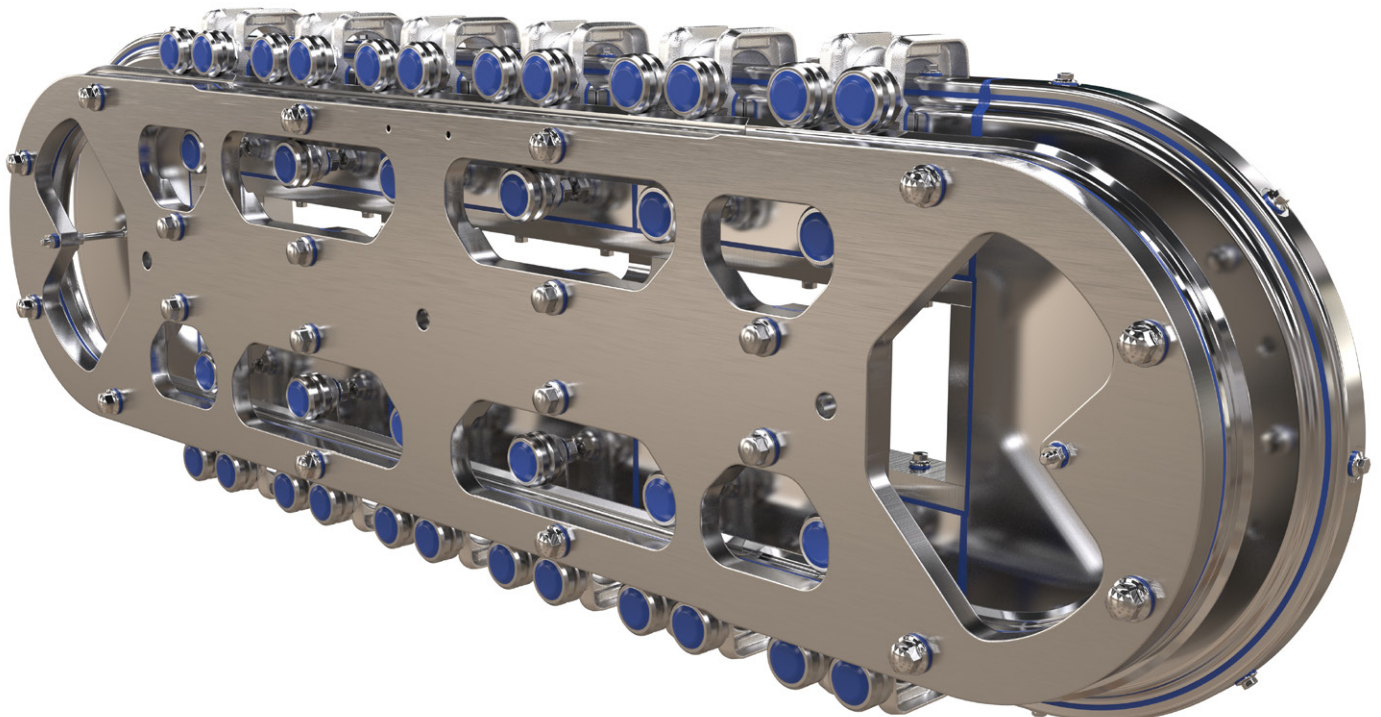
GFX-hC Cleandown

Suitable for "wet" cleaning and uses a structure that is very similar to a standard GFX, but modified to fit the HD (Hygienic Design) motors. Ideally suited for applications in pharmaceutical, food and other processes that require wet cleaning with benign liquids or wet wipes to remove surface contamination. Fasteners are grade A2 stainless steel.



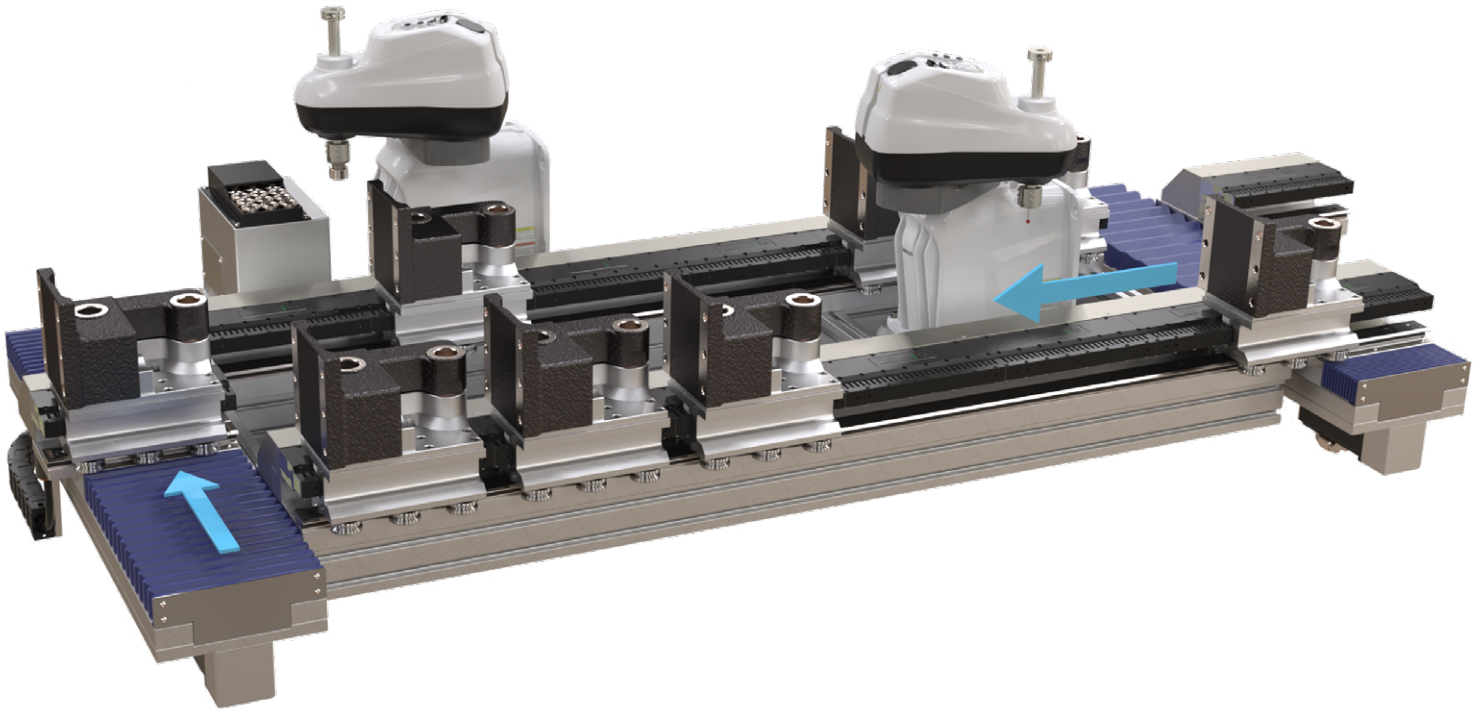
GFX-hA Aseptic

Fully stainless steel construction, has applications in pharmaceutical and other processes where aggressive cleaning chemicals are used.

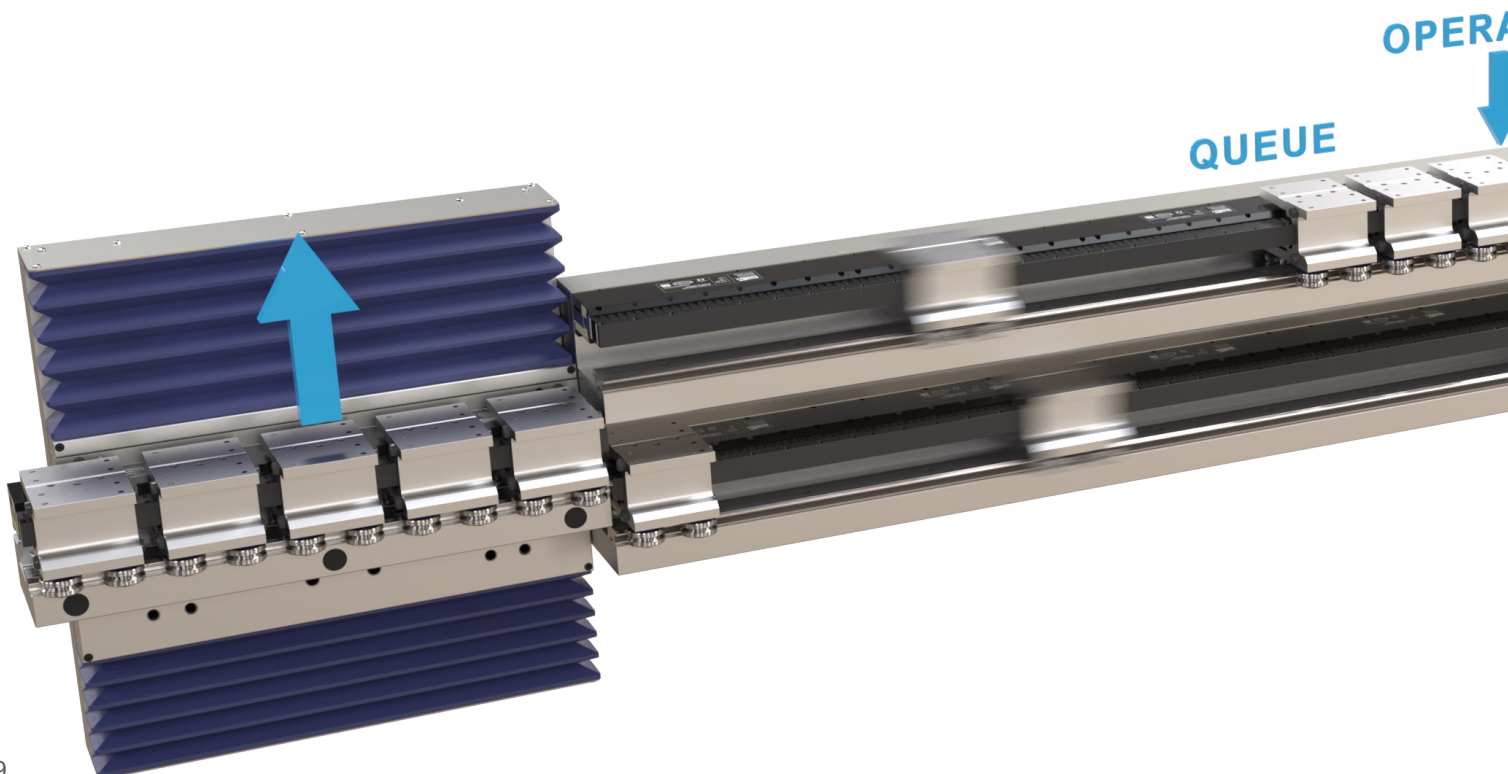


GFX-r ↓

GFX-r provides the hardware for machine movements in rectangular paths. The absence of curved motor sections allows movers to be much stronger, more powerful and with a larger mounting platform, while maintaining accuracy, durability and agility. Mover speeds of 4m/s, payloads up to 100kg and up to 3600N unsupported process loads are possible. Movers with longer magnet arrays can also reduce heating losses by up to 60%.

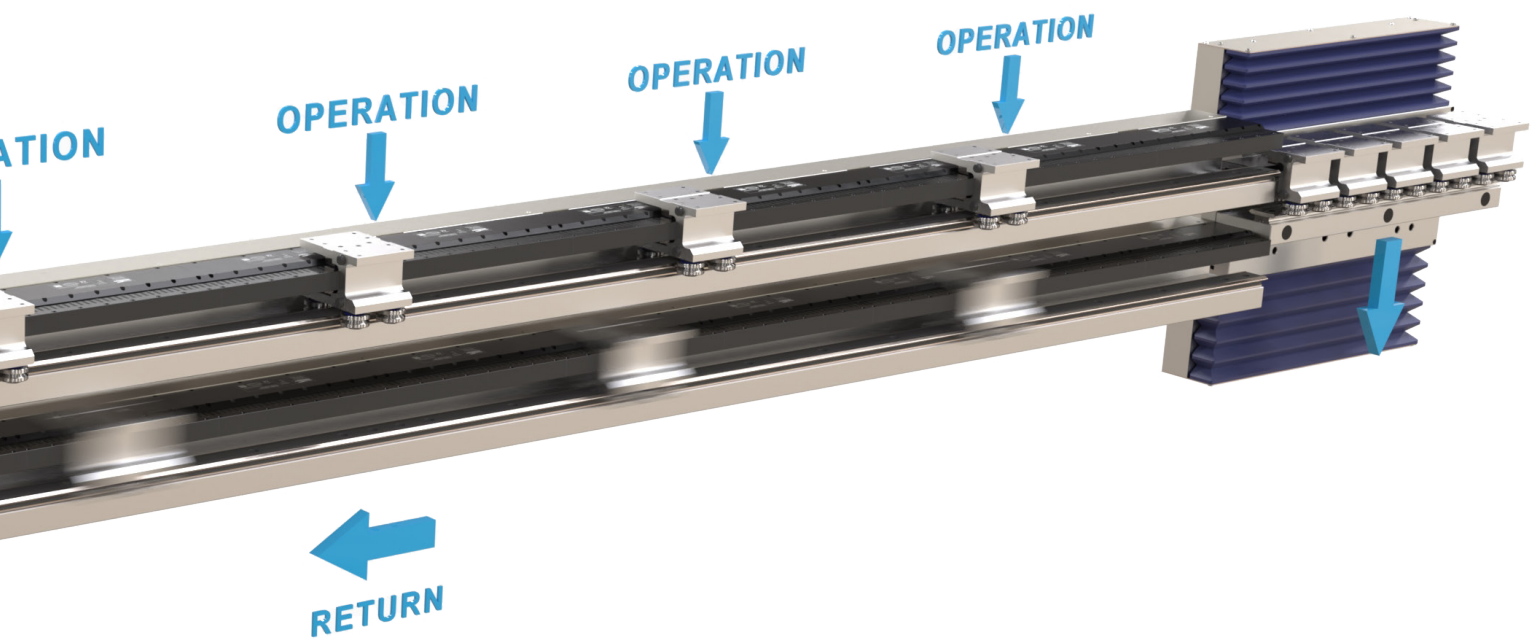
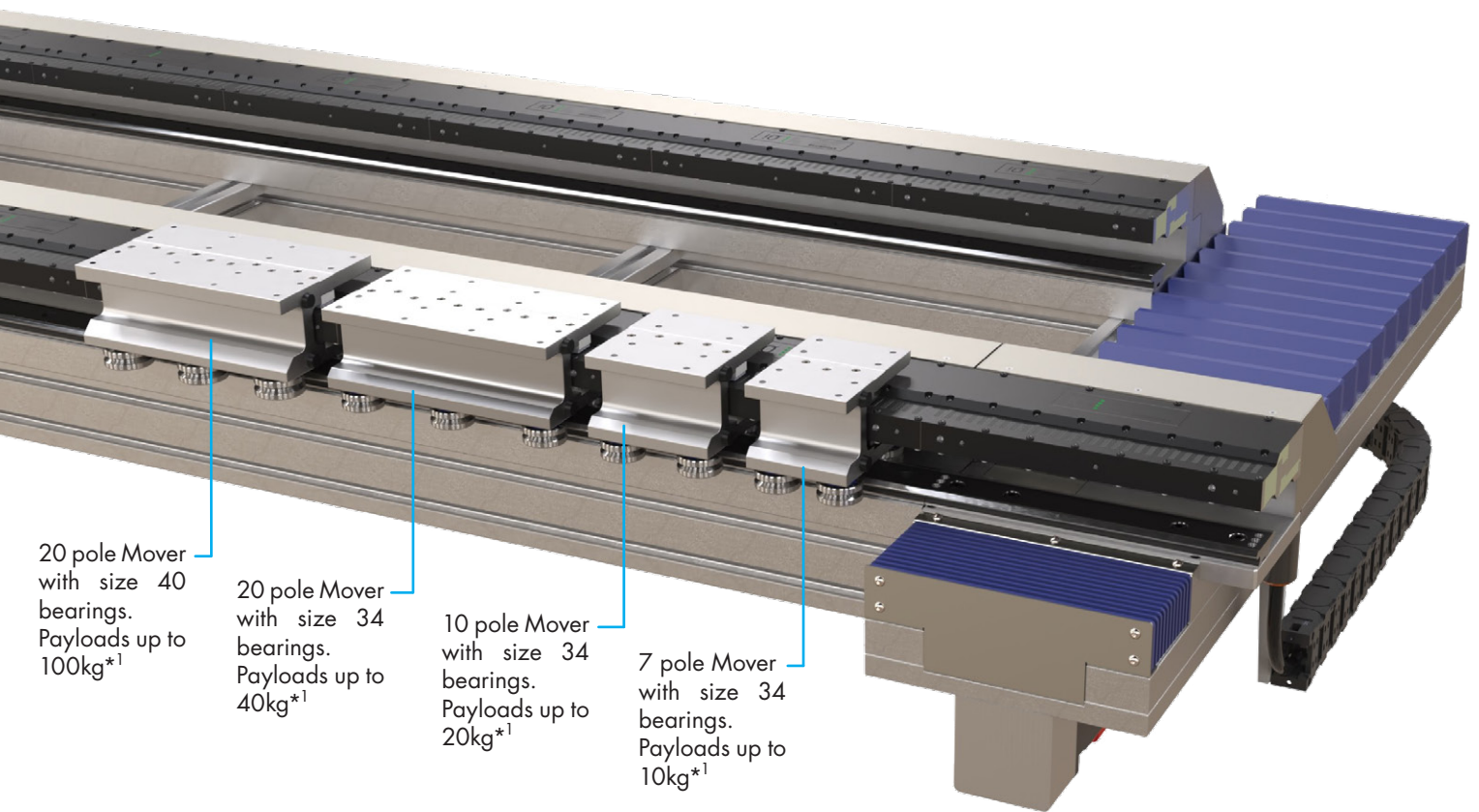


GFX-r systems will often be used in machine cells incorporating robots, power tools and sensors for automated assembly and inspection systems. The illustration below shows an example application to give an idea of what can be achieved



GFX Product Family

GFX-r is available with a range of mover sizes. These are tailored to a specific range of payloads from 10kg up to 100kg^{*1}. 4 or 6 bearing movers available for increased strength and stability.

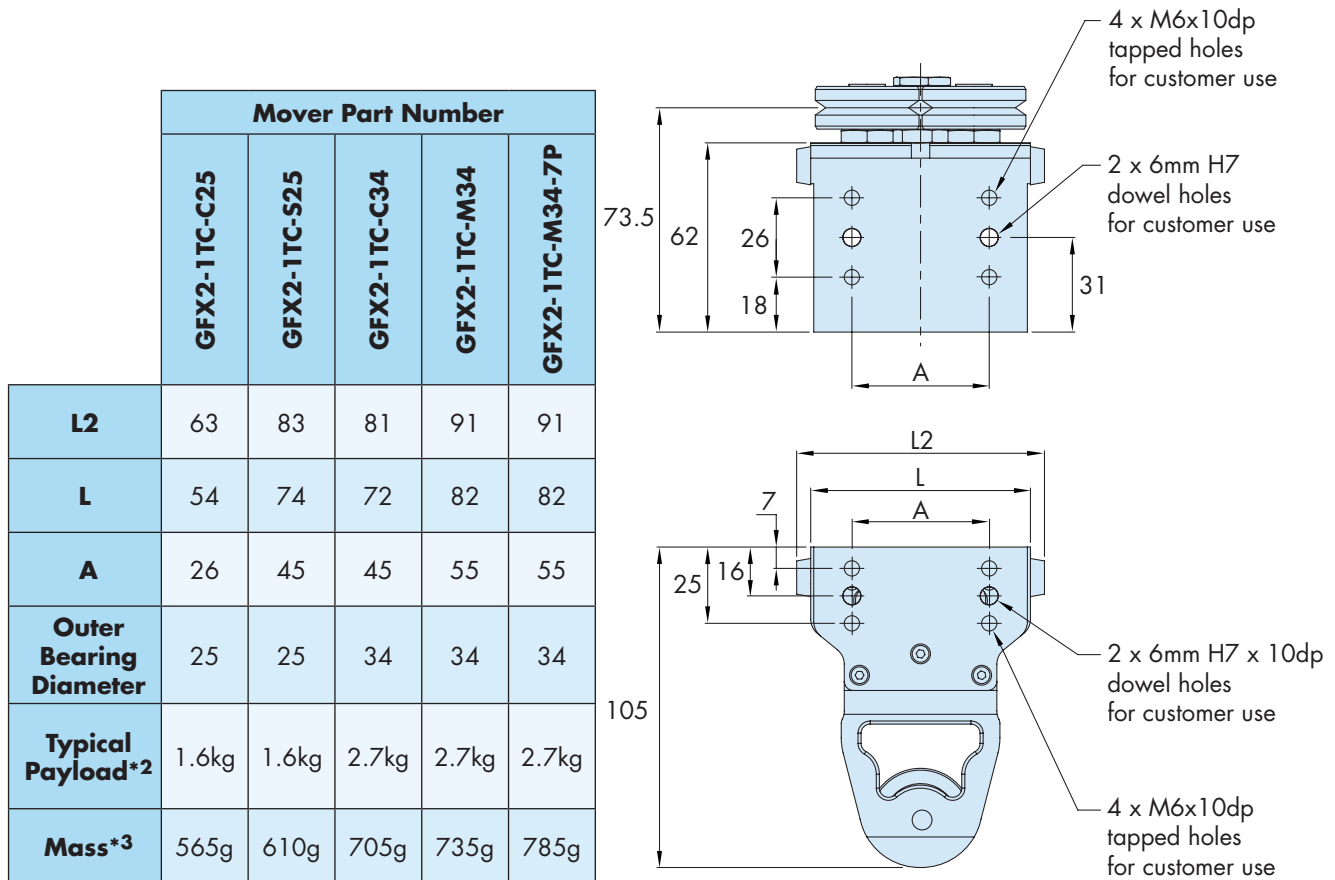
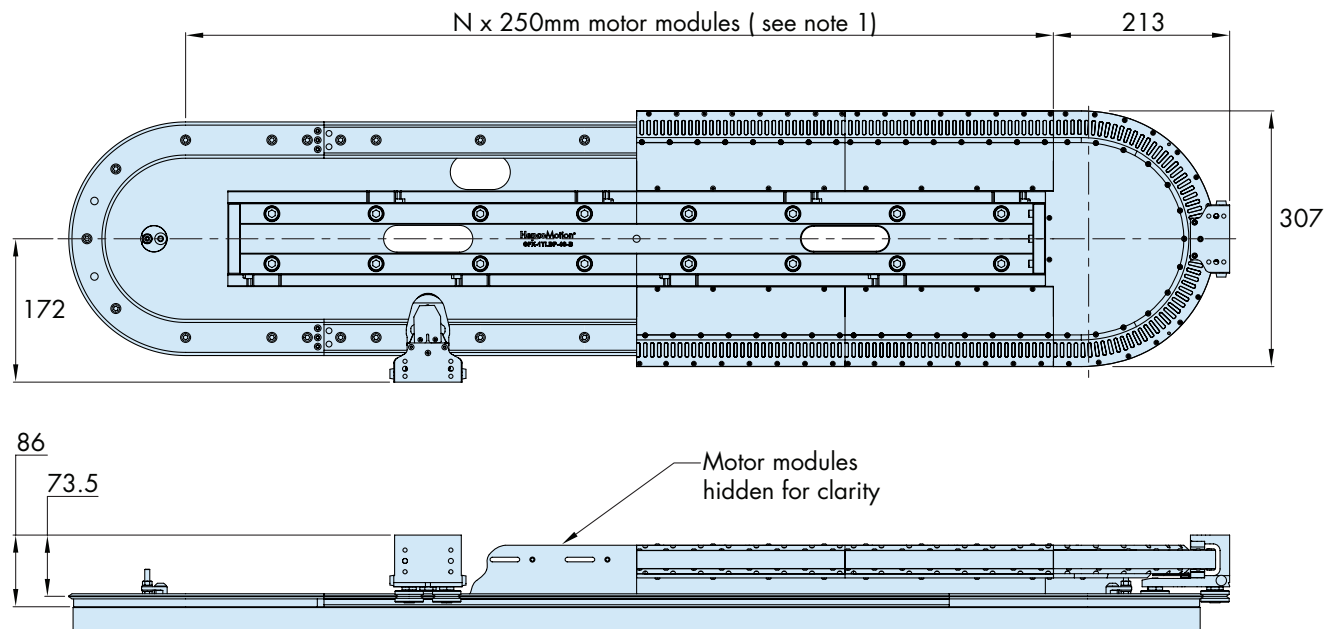


Notes

1. Depending on application. Please discuss your requirements with Hepco's Technical department.

Technical Data - GFX 1TL Systems

GFX 1TL systems are comprised of two 1-Trak end segments and ground GV3 or stainless steel SL2 spacer slides. These can be supplied as a set of components or assembled to a solid aluminium baseplate. Assembled systems can be supplied with motor support structures and all the required fasteners for motor connection or fully assembled with Beckhoff XTS motors. External dimensions are shown below. For more information please contact Hepco's technical department.

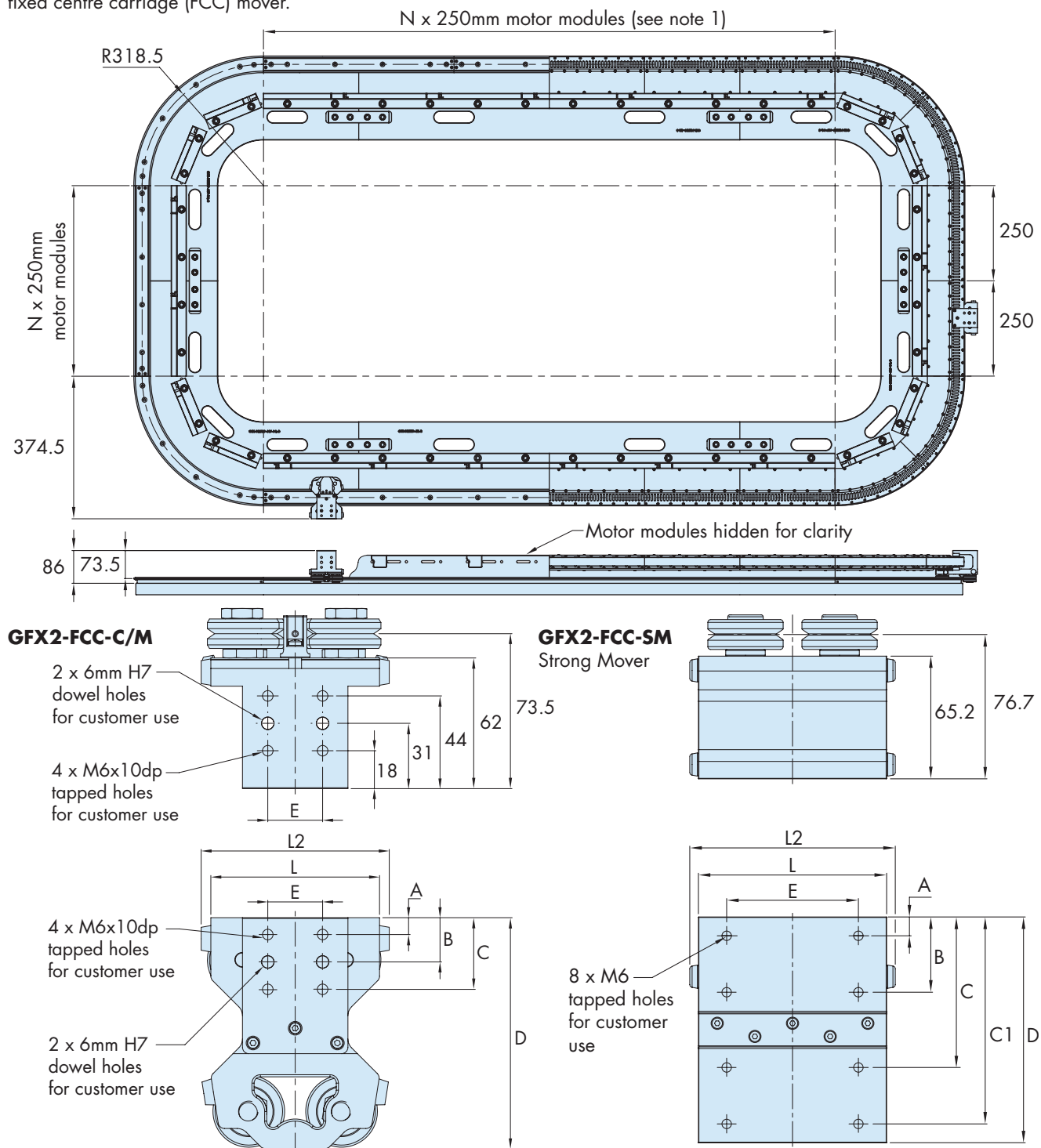


Notes:

1. GFX 1TL is available with almost unlimited movers and almost unlimited lengths, please contact Hepco's technical department to discuss your application.
2. Typical payload will achieve life in excess of 100,000km. Higher payloads with lower speed/acceleration are possible.
3. Mass of movers includes Beckhoff magnet and encoder flag assembly.
4. See [13](#) for system designs.

Technical Data - GFX PRT2 Systems

Guidance systems for Beckhoff XTS can also be supplied as PRT2 ring and track assemblies, which can be configured into oval, rectangular and circular systems. Motor modules are supplied in 45° or 22.5° segments. PRT2 systems require a four bearing fixed centre carriage (FCC) mover.



Mover Part Number	A	B	C	C1	D*4	E	L	L2	Bearing Diameter	Typical Payload*2	Mass*3
GFX2-FCC-C25	7	18	29	-	91.5	26	52	61.2	25	1.6kg	600g
GFX2-FCC-M34	8	21	34	-	109.5	26	80	89	34	3.2kg	835g
GFX2-FCC-M34-7P						50					945g
GFX2-FCC-M34-10P	8	21	34	-	109.5	70	102	111	34	3.2kg	1045g
GFX2-FCC-SM34-10P	14	40	80	106	120	60	100	109.2	34	7kg	1260g
GFX2-FCC-M40-10P	8	21	34	-	121.5	70	102	111	40	8.2kg	1485g
GFX2-FCC-SM40-10P	10	40	80	110	120	70	100	109.2	40	15kg	1550g

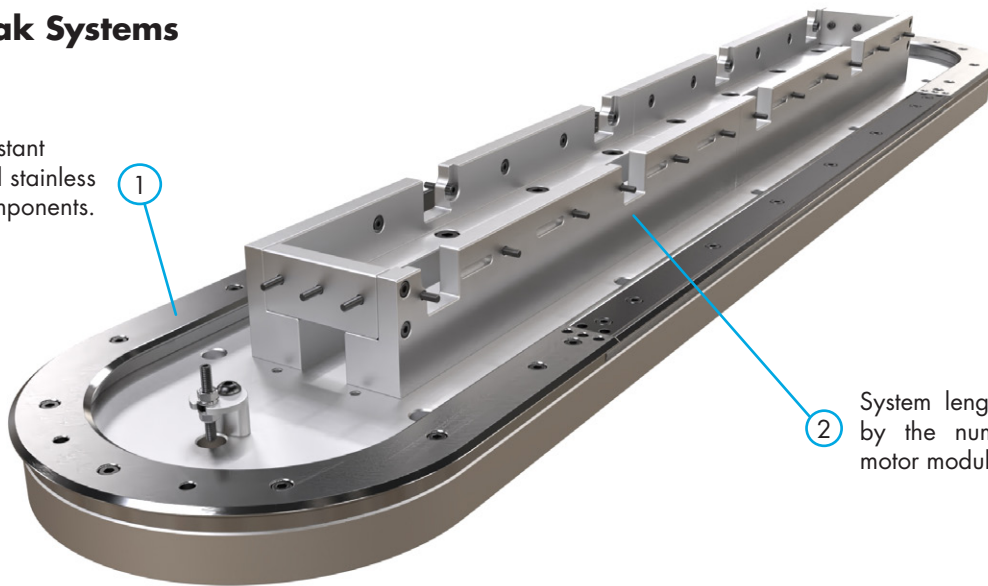
Notes:

- GFX PRT2 systems are available with almost unlimited movers and almost unlimited lengths, please contact Hepco's technical department to discuss your application.
- Typical payload will achieve life in excess of 100,000km. Higher payloads with lower speed/acceleration are possible.
- Mass of movers includes Beckhoff magnet and encoder flag assembly.
- Size 25 and 34 mover profiles vary slightly, please see page 4 for a visual comparison.

System and Component Specification - GFX 1-Trak Systems

GFX 1-Trak Systems

Corrosion resistant systems use all stainless steel track components.

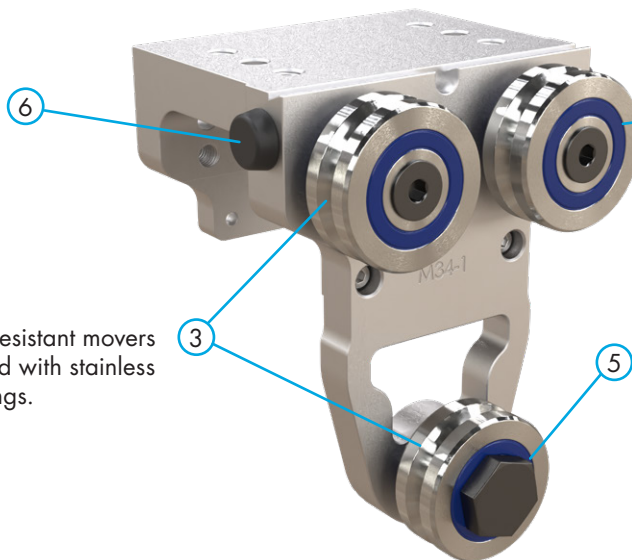


System length is determined by the number of straight motor modules.

Product GFX - **Corrosion Resistant Option** (CR) - **System Type** 1TL - **System Length** 4M - B

1TL - 1-Trak Lite (See page 3)

Movers



Corrosion resistant movers are supplied with stainless steel bearings.

Outer bearing size also determines the size of the mover. Please see page 11 for more mover information.

Bearings are axial stiffness as standard.

10 x **Product** GFX2 - **Corrosion Resistant Option***3 (CR) - **Mover Type** 1TC - **Mover Size** M34 - **Magnet Pole Size** 7P - **Bearing Type** AS - **Collision Mitigation***3 (CM) - **No Cable Technology***3,5 (NCT)

1TC - 1-Trak Mover

C25 - Compact 25 bearings
S25 - Standard 25 bearings
C34 - Compact 34 Bearings
M34 - Standard 34 bearings

CM - Buffers Fitted

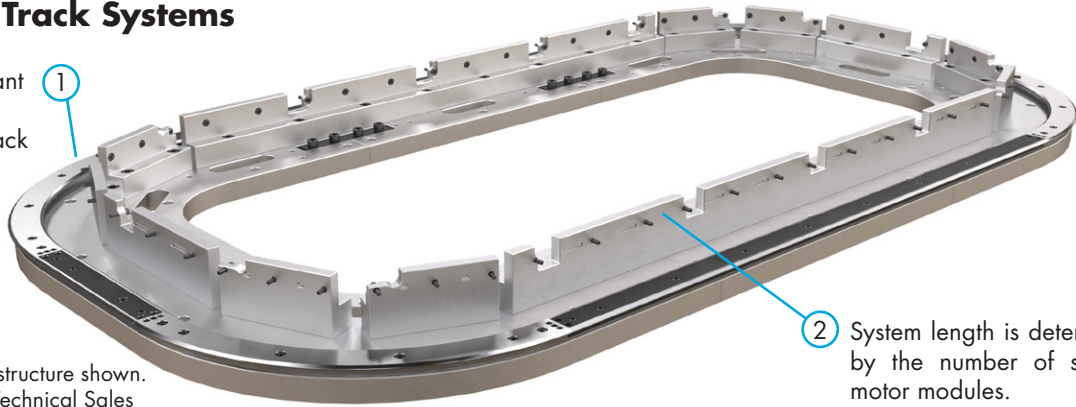
AS - Axial Stiffness

7P - M34 only

System and Component Specification - GFX PRT2 Systems

GFX PRT2 Track Systems

Corrosion resistant systems use all stainless steel track components.



Optional support structure shown. Contact Hepco's Technical Sales Department for more information.

GFX - (CR) - 637 - OVAL-4M - B

Product

GFX

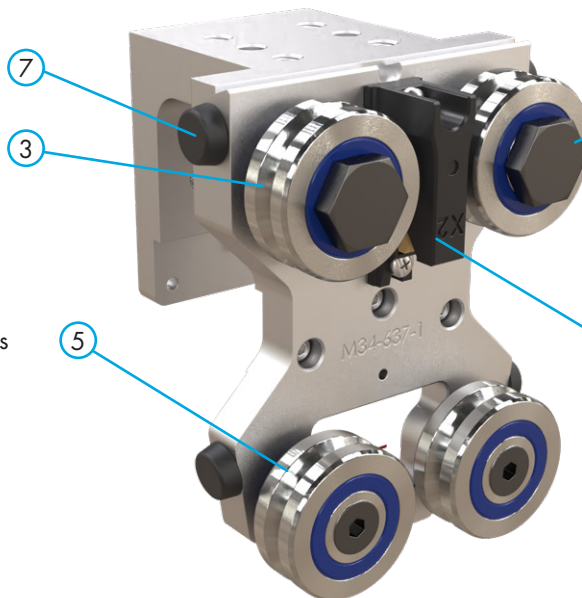
Corrosion Resistant Option
(Leave blank if not required)

System Size (See page 12)
OVAL-4M-B - (Oval)
4MX2M-B - (Rectangular)
RING-8M-B - (360° Ring*1)

Segment Diameter
637 - 45° Modules
1274 - 22.5° Modules*1

Movers

Corrosion resistant movers are supplied with stainless steel bearings.



Bearings are axial stiffness as standard.

Outer bearing size also determines the size of the mover. Please see page 12 for more mover information.

Fixed centre movers (FCC) can be supplied with slide lubricators. One lubricator is supplied per carriage on alternating sides of the carriage to minimise friction.

20 x **GFX2 - (CR) - FCC - 637 - M34 - 7P - AS - (LB) - (CM) - (NCT)**

Product

GFX

Corrosion Resistant Option*3

Mover Type

FCC - Fixed centre (PRT2)

Segment Diameter

637 - 45° modules

1274 - 22.5° modules

Mover Size

C25 - Compact 25 bearings

M34 - Standard 34 bearings

SM34 - Strong 34 bearings

M40 - Standard 40 bearings*4

SM40 - Strong 40 bearings*4

Notes

- 360° GFX ring systems using 22.5° motor modules and 1274mm diameter rings require 16 motor modules.
- All movers are supplied fully assembled and adjusted to a system, unless requested otherwise.
- Leave blank if not required.
- Corrosion resistant version not available on M40 bearing option.
- Please see page 15 for more details on NCT.

No Cable Technology*3,5
NCT - Holes to fit No Cable Technology

Collision Mitigation*3
CM - Buffers Fitted

Additional Options*3
LB - Slide lubricators

Bearing Type
AS - Axial Stiffness

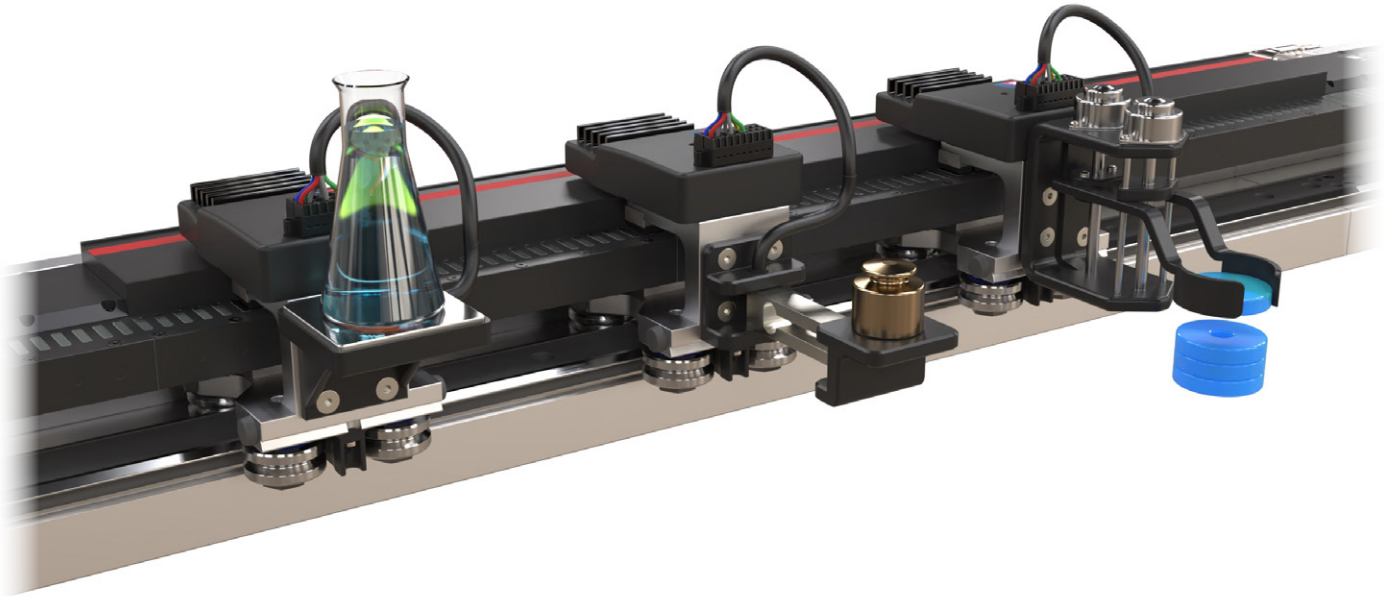
Magnet Pole Size
7P - 7 Pole Magnet
10P - 10 Pole Magnet
Leave blank for standard

System and Component Specification

NCT - No Cable Technology

NCT enables contactless, continuous power and data transmissions to the GFX mover (with NCT fitted). This allows functions to take place directly on the mover, for example scanning bar codes, measurements of weights, stacking options as shown below.

Please discuss with Beckhoff XTS-Support@beckhoff.com before ordering to check it is compatible with your application.



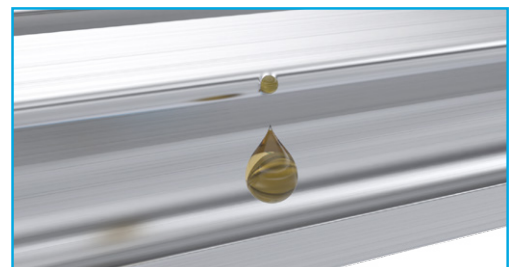
Bleed Lubrication

Sufficient lubrication is essential for all Hepco guidance systems for Beckhoff XTS. All systems incorporate a bleed lubrication facility, which channels lubricant directly to the V faces of the slide.

Lubricant is then distributed around the system by the movers. This process can be aided with lubricators mounted on movers (PRT2 systems only).

It is highly recommended that lubrication ports are situated approximately every 3 metres of track. For more information on lubrication requirements, flow rates and food grade lubricants, please see the [GFX Lubrication](#) datasheet.

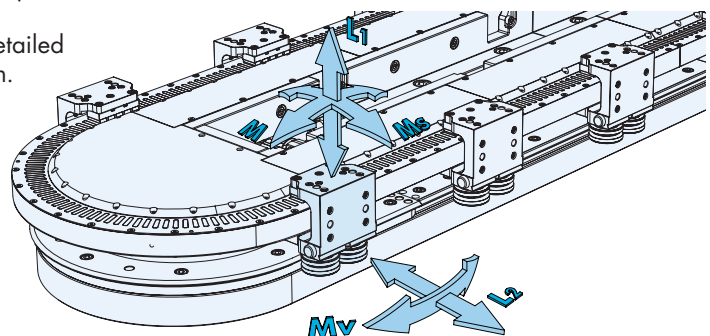
For more information please contact Hepco's technical department.



System Loading

Fundamental GFX mover geometry determines the life of the system. The loads applied both directly ($L1$ & $L2$), size and position of the payload combined with the acceleration (M , M_s & M_v) allow for an accurate and reliable life calculation to be obtained.

Please contact Hepco's technical department for more detailed information on system loading to suit a specific application.



Further Information

Please visit hepcotion.com to access more information on the GFX product range or alternatively contact Hepco's technical department who will be happy to discuss your requirement.



Ring Slides & Segments

Material and finish:

Standard version: High carbon steel, hardened on V faces.
Ground on all main surfaces to N5 finish.

Stainless steel version: Special martensitic stainless steel generally conforming to 420 series, hardened on V faces. Ground on all main surfaces to N5 finish.

Track System Slides

Material and finish:

Standard version: High carbon-chromium steel, hardened on V faces.

Ground on all main surfaces to N5 finish, other faces chemically blacked.

Stainless steel version: Special martensitic stainless steel generally conforming to 420 series, hardened on V faces. Ground on all main surfaces to N5 finish.

Bearings

Bearing rings, balls, rollers:

Standard version: Bearing steel AISI 52100 hardened and tempered.

Stainless steel version: AISI 440C stainless bearing steel, hardened and tempered.

Seals:

Standard version: Nitrile rubber.

Hygienic hW & hA: FKM (Fluoroelastomer)

Cages:

Plastic.

Studs:

Standard version: High tensile steel with chemical black finish.

Stainless steel version: AISI 303 series stainless steel.

Movers & Support Structures

Material:

High strength aluminium alloy

Finish:

Clear anodised

Lubricators

Material:

Impact resistant plastic with felt wiper.

Frictional Resistance for 'V' Slide Systems

Coefficient of friction (without Lubricators) = 0.02

Lubricators add friction as follows:

One Lubricator per Carriage, SSLB34 = 1.5N.

External Lubrication

Lubricators should be oiled using 68 cSt viscosity or similar oil. Food compatible lubricants can also be used.



This data sheet interacts with
GFX Catalogue

GFX Lubrication

Bleed Lubrication

Sufficient lubrication is essential for all of Hepco's guidance systems for Beckhoff XTS. Bleed lubrication is incorporated in all GFX systems as standard. This facility channels lubricant directly to the vee faces.

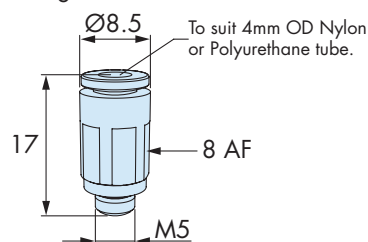


It is highly recommended that lubrication ports are situated once every 3 meters of track for systems without lubricators, or once every 6 meters of track for systems with lubricators.

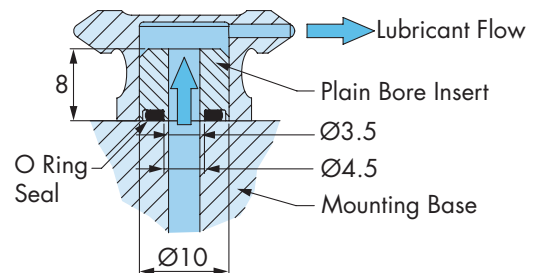
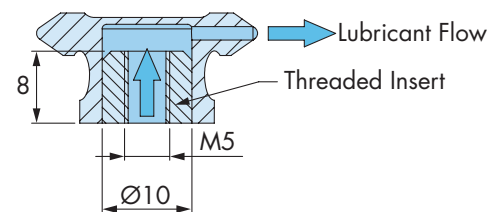
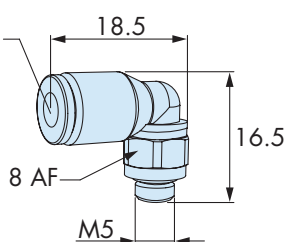
As standard, 1-Trak GFX systems will be supplied with an M5 tapped hole, suitable for standard lubrication fittings (as shown below). For PRT2 GFX systems, there are two types of bleed lubrication inserts (shown in the illustration on the right) allowing for various methods of lubrication routing.

Standard lubrication fittings.

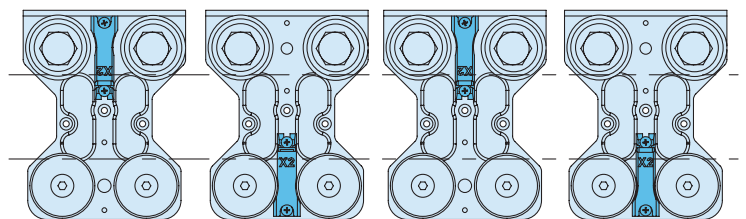
Straight Connector



90 ° Connector



Lubricant is then distributed around the system by the movers. This process can be aided with lubricators mounted on movers (Lubricators are only available on four bearing PRT2 movers). Lubricators should be positioned on alternating movers as shown to minimise the additional friction.



Flow Rate Calculation

For the majority of systems with no special duty requirements and running up to speeds of approximately 4m/s the following calculation can be used to work out the required flow rate:

$$0.1\text{ml/vee/metre/24hr}$$

This can be rewritten to calculate an estimated required flow rate per day as:

$$0.1\text{ml} \times \text{metres of track} \times \frac{\text{Daily Cycle (hours)}}{24 \text{ hours}} = \text{ml per V per day}$$

For example, a 10 module oval system (comprising of roughly 5.5 meters of track) running 2 x 8 hour shifts per day will require:

$$0.1\text{ml} \times 5.5 \times \frac{16}{24} = 0.37\text{ml per V per day}$$

Lubricant Specification

- The lubricant type and specification is dependant on the application and environment. However, it is common for a grease to be chosen over an oil lubricant in the absence of mover lubricators as this will adhere to the V faces.
- There are many specialist lubricants such as food compatible or extreme temperature greases/oils. Please contact Hepco's technical department for more information.
- Oil - Slideway oil, viscosity 68 cSt or equivalent.
- Grease - NLGI 2 Lithium Soap or equivalent.

Automated Lubrication Systems

- Hepco does not supply lubrication pumps or recommend any specific equipment.
- Pump must be rated and specified to the appropriate flow rates calculated above.
- Lubrication systems must be maintained and operated within the manufacturers specification.
- Hepco cannot accept responsibility for the installation, commissioning or reliability of third party hardware.

Lubrication System Integration

- It is understood that the Beckhoff TwinCAT control system is capable of controlling and monitoring suitably equipped lubrication pumps, please discuss with Beckhoff.

Aerosol Distribution

- GFX lubrication is an open application process.
- However it is not a "total-loss" system, lubricant being recycled and distributed around the track system during operation.
- There is the probability of aerosol distribution of tiny droplets of lubrication materials on non-running surfaces, mover assemblies, motor modules and adjacent equipment.

Build-up of Waste Lubricant

- Grease will tend to build up in enclosed areas and non-running surfaces of the bearings.
- This can be ejected from the system as large (>0.2ml) deposits.

Cleaning and Re-starting

- To prevent contamination of processes, cleaning must be undertaken as part of the regular maintenance.
 - Remove visible deposits from the outer diameter of bearings.
 - Wipe the slide, paying particular attention to the inner faces and cavities.
 - If necessary, remove the mover & motor assemblies (as described in the manual) to get suitable access.
- All track V surfaces must be lightly lubricated before re-starting the system.

Notes

[illegible]

Notes

[illegible]

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